

Variation in Hispaniolian *Sphaerodactylus* (Sauria: Gekkonidae)

RICHARD THOMAS¹

ALBERT SCHWARTZ²

ABSTRACT. A review of the gekkonid species *Sphaerodactylus altavelensis* assesses variation and clarifies the nomenclature. Four subspecies (one described herein) are recognized. A second species, apparently related to *S. altavelensis*, is described as *S. williamsi*.

INTRODUCTION

The West Indian island of Hispaniola is the center of radiation of members of the *notatus* group of the gekkonid lizard genus *Sphaerodactylus*. The *difficilis* complex (of the *notatus* group) is the most widespread and diverse; this complex is named for *S. difficilis* Barbour, the first species in the complex to be described. The last revision of the complex was that of Shreve (1968); since that time we have named four new species (*S. cryphius*, *S. ocoae*, *S. nycteropus*, *S. zygaena*; Thomas and Schwartz, 1977; Schwartz and Thomas, 1977), and removed a subspecies of *S. difficilis* as a separate species (*S. randi*; Schwartz, 1977). This then is our fourth paper dealing with the Hispaniolan *difficilis* complex. There remain eight nominal species in the complex (Schwartz and Thomas, 1975); among these species we have made nomenclatural changes that require justification. The present paper justifies

these changes and assesses the variation in one of the remaining species, *S. altavelensis* Noble and Hassler and describes another. Our arrangement is due primarily to having collected and examined in detail many more specimens than were available to Shreve (1968) and to having visited many areas in Hispaniola whose *Sphaerodactylus* fauna had been either poorly known or altogether unknown. In the following accounts, measurements and counts in parentheses represent mean values.

TAXONOMIC ACCOUNTS

Sphaerodactylus altavelensis Noble and Hassler

Definition. A species of *Sphaerodactylus* with large acute, strongly keeled, flattened, imbricate dorsal scales, axilla to groin 20 to 36; no area of middorsal granules or granular scales; dorsal body scales with four to six hair-bearing scale organs around apex and distal edge, each with one hair. Dorsal scales of tail keeled, acute, imbricate, flat-lying; ventral scales of tail smooth, rounded, enlarged midventrally. Snout blunt, not depressed or decurved; snout scales moderate in size, rounded, keeled, juxtaposed, cobblelike to weakly raised on posterior edge, or weakly imbricate; 2 postnasals; 0 to 3 internasals; upper labials to mid-eye 3; dorsal head scales

¹Biology Department, University of Puerto Rico, Río Piedras, Puerto Rico 00931.

²Miami-Dade Community College, North Campus, Miami, Florida 33167, U.S.A.

small, rounded to subhexagonal, keeled, juxtaposed and cobblelike to weakly raised on posterior edge; temporal scales broad, rounded, keeled, raised, weakly imbricate; first infralabial subrectangular to subtriangular; gular scales between infralabial rami rounded to hexagonal, moderately-sized, smooth to keeled, juxtaposed to weakly imbricate; central gulars small, acute, imbricate, smooth to keeled; some gular scales keeled in nearly all specimens; chest scales smooth; ventral scales smooth, rounded, imbricate, axilla to groin 22 to 32; scales around midbody 38 to 62; fourth toe lamellae 6 to 13; escutcheon with broad central area and extensions onto thighs to underside of knee area (3–8 × 11–27).

Color pattern in life weakly dichromatic; males with yellow throat ground color and reduced pattern, occasionally unicolor. Pattern of paired light areas on upper surface of head, followed by second pair on occiput and neck; dark scapular patch and scapular ocelli surrounded by continuous light border concave anteriorly and convex posteriorly; dorsal body pattern of dark spotting or lines or combination of both; venter pale with dark lines; throat with dark lines or mottling; sacral pattern of dorsolateral light and dark lines; and tail with dark middorsal zone and series of irregular ocelli. We have examined 847 *S. altavelensis*.

Basic pattern. In order to facilitate descriptions of variation in the subspecies of *S. altavelensis*, we will describe in some detail here the basic pattern for the species. The fullest pattern development is found in some females of two of the subspecies. For convenience of discussion the basic pattern is broken down into the following elements:

Anterior cephalic figure. A posteriorly directed, bilobed, light figure outlined in dark pigment extending to about the level of the ear opening; the breadth covers most of the dorsal surface of the head; the lines forming the lateral edges originate as superior postocular stripes.

Posterior cephalic figure. A bipartite, dark-edged figure in the occipitonuchal area having posteriorly directed lobes, the anterior margins being formed by the posterior edges of the anterior cephalic figure.

Scapular figure. A complex figure consisting of 1) a black, roughly rectangular scapular patch enclosing; 2) a pair of pale ocelli; and 3) a narrow light border of greater extent than the patch (i.e., including an area of ground color peripheral to the patch), in roughly the shape of an inverse concave-convex trapezoid, and formed of a dark-edged light line.

Body pattern. About ten longitudinal dark lines occur on the dorsum (3) and sides (2) and venter (about 5); the dorsal series extends from the scapular figure to the sacral region; the lateral lines extend from the post-axillary region to the groin, and the ventral lines, which are faintest, extend irregularly from about midbody to the groin and vent. The lineate pattern is rarely as fully expressed as described, but many females show indications of it. Often, however, the dorsal body pattern is one of small dark spots about one to three scales in area, irregularly distributed. The spotted pattern seems to be derived from fragmentation of the linear one, in which even those individuals with spotted patterns have lines in the sacral region and on the venter.

Sacral figure. A pair of dorsolateral stripes on each side form the dark edges of a light dorsolateral sacral zone, which extends beyond the sacral region and fades on the posterior body and base of the tail.

Tail pattern. Six very dark longitudinal lines around the circumference form a lineate pattern: a dorsolateral pair of lines which is invaded by several pairs of pale ocelli, a lateral pair of lines, and a ventrolateral pair; the spaces between the dorsolateral and lateral, and the lateral and ventrolateral lines are very light, forming a contrastingly striped lateral tail pattern. The lateral and ventrolateral stripes with their pale inter-

spaces continue anteriorly onto the posterior surface of the thigh to form a prominent zonation there.

Male pattern. Males lose the basic pattern as they mature and assume either a nearly uniform brown or a uniformly spotted pattern. Faint remnants of the basic pattern may persist, and in a few individuals (and in one subspecies) apparently mature males retain rather fully developed basic patterns. The scapular patch is present in males of three subspecies (see below). Some males show an intensification of the head markings in which the edges of the markings become darkened and intensified with eventual loss of the lighter areas resulting in a vermiculate pattern.

Distribution. Isla Alto Velo; on the

mainland of Hispaniola, from the Llanos de Azua in the east, west continuously to the Baie de Port-au-Prince in xeric to semi-xeric situations, along the north coast of the basal Tiburon Peninsula to the vicinity of Petit-Goâve and south through the Vallée de Trouin (presumptive) to the vicinity of Cayes Jacmel on the south coast. A population occurs in the vicinity of Jérémie on the distal Tiburon Peninsula, and another on tiny Ile à Cabrit in the Golfe de la Gonâve (Schwartz, 1979). On the north island, *Sphaerodactylus altavelensis* is known from the coast north of Port-au-Prince to Pierre Payen and inland in the vicinity of Lascahobas and in the northwest from Gonaïves to Port-de-Paix and Ennery in Haiti (Fig. 1).

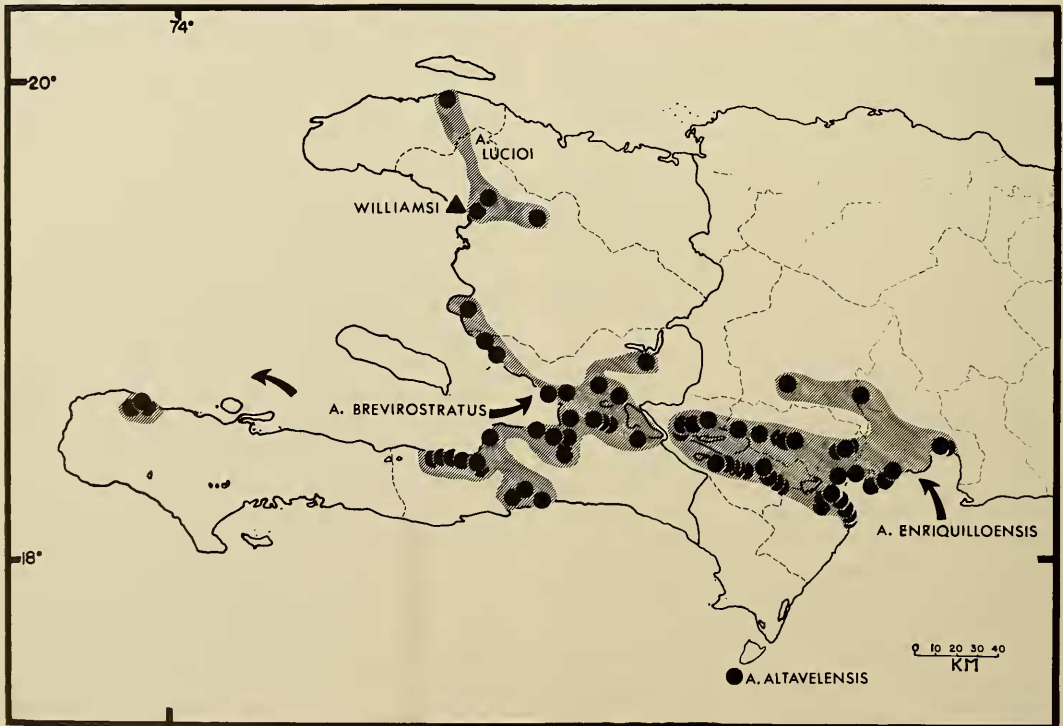


Figure 1. Map of western and central Hispaniola, showing the known distributions of *S. altavelensis* (●) and *S. williamsi* (▲). Subspecies of *S. altavelensis* are noted and their ranges shaded.

Sphaerodactylus altavelensis altavelensis
Noble and Hassler
Figures 2A, 3A

Sphaerodactylus altavelensis Noble and Hassler, 1933. Amer. Mus. Novitates, 652: 7.

Type locality. Isla Alto Velo, República Dominicana.

Holotype. AMNH 51488.

Definition. An insular subspecies of *Sphaerodactylus altavelensis* characterized by large size, high midbody scale counts (44–62), and very bold contrasting basic pattern (females).

Distribution. Isla Alto Velo, República Dominicana.

Variation. We have examined 22 specimens. Largest male (AMNH 51490) 28 mm snout-vent length (SVL), largest female (MCZ 45947) 29 mm SVL; dorsal scales between axilla and groin 26 to 36 (30.1); ventral scales axilla to groin 22 to 32 (27.9); scales around midbody 44 to 62 (51.7); supralabials to mid-eye 3/3; internasals 1 (N=21), 3 (N=1); fourth toe lamellae 8 to 11 (mode 10); throat scales keeled; escutcheon 3 to 6 × 22 to 27.

Males have a uniform grayish ground color and a nearly uniform scattering of dark brown spots over the dorsal surface of the head and body; the scapular patch and ocelli are absent or reduced to minute ocelli connected by a small scapular patch that does not include the ocelli. Most females show a bold development of the basic pattern in which the anterior and posterior cephalic figures are heavily outlined in dark pigment; the scapular patch is large and encloses the pair of ocelli, and the light scapular figure border is markedly concave-convex producing a comic-mask mouth appearance (Fig. 3A). The dorsal body pattern of females is heavily mottled or vermiculate with a tendency towards formation of transverse dark markings reaching an extreme in AMNH 51478. Some females show a simplification and fragmentation of pattern that ap-

proaches the spotted male pattern; the anterior and posterior cephalic figures are fragmented; the scapular patch and ocelli are reduced; and the scapular figure border is absent. Lateral and sacral lines are prominent in consonance with the boldness of the rest of the pattern; ventral lines are present as in the other populations of the species.

Remarks. Shreve (1968) regarded *S. altavelensis* as a species confined to Isla Alto Velo and suggested that it was related to *S. difficilis randi* (= *S. randi*; Schwartz, 1977). The bold scapular figure and dorsal spotting of some *randi* populations do bear a resemblance to *altavelensis*. However, the trilineate head pattern of *randi* plus the presence of a completely expressed basic pattern such as is found in Shreve's *S. brevirostratus* (and the lack of these pattern elements in *randi*) leave no question of the relationship of the Alto Velo sphaerodactyls to *brevirostratus*. In fact, the scapular pattern of *S. randi* only superficially resembles that of *S. altavelensis*. Shreve examined only the two MCZ paratypes of *altavelensis*, in which the pattern is not so well expressed as in some of the other specimens.

Sphaerodactylus a. altavelensis is separated from other populations of the species by not only a water gap but also, as far as is known, by a significant geographic hiatus that includes all of the Peninsula de Barahona. The nearest records are the region just to the south of the city of Barahona on the east, and the region of Cayes Jacmel to the west. Although the species may occur farther east along the south coast of Haiti than Cayes Jacmel, it apparently does not extend to the region of Pedernales on the Dominican-Haitian border—an area that has been relatively well-collected and from which other species of *Sphaerodactylus* are known. Another similarly relict member of the Alto Velo fauna is *Leiocephalus vinculum altavelensis* Noble and Hassler (Schwartz, 1967).

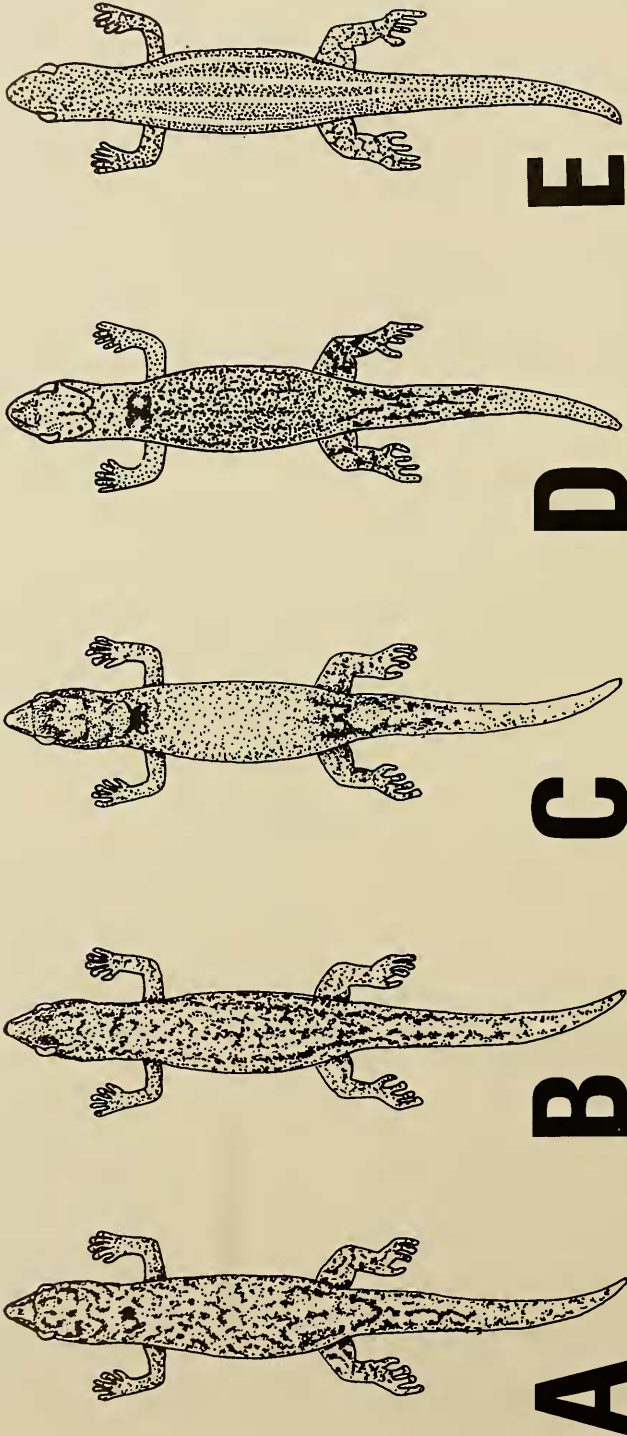


Figure 2. Dorsal views of subspecies of *S. altavelensis* and *S. williamsi* as follow: A. *S. a. altavelensis* (AMNH 51485). B. *S. a. enrriquilloensis* (ASFS V23288). C. *S. a. brevirostratus* (ASFS X2376). D. *S. a. lucioi* (MCZ 156208—holotype). E. *S. williamsi* (MCZ 156209—holotype).

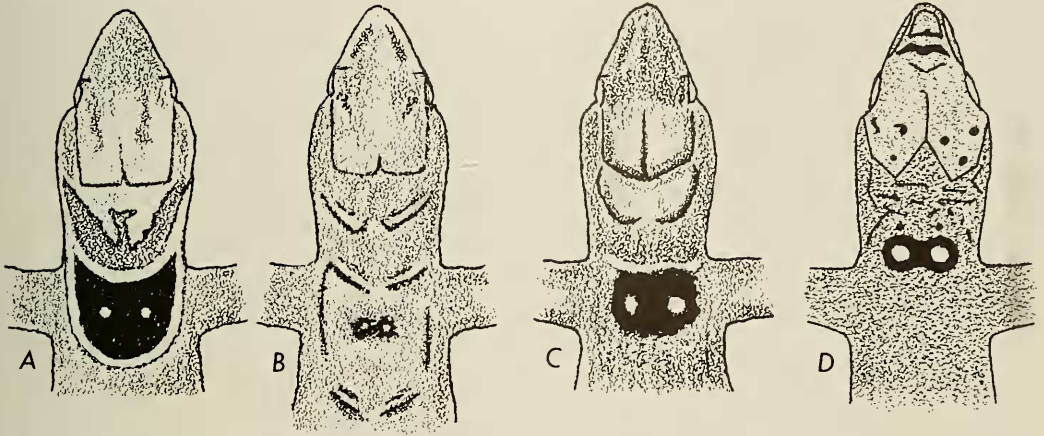


Figure 3. Diagrammatic dorsal views of cephalic and scapular patterns of *S. altavelensis* (see text for discussions of variation), as follow: A. *S. a. altavelensis*. B. *S. a. enriquilloensis*, C. *S. a. brevirostratus*. D. *S. a. lucioi*.

Specimens examined. REPÚBLICA DOMINICANA: *Isla Alto Velo*: AMNH 51472-86, AMNH 51489-91, MCZ 45946-47, AMNH 51488, ASFS V26910.

Sphaerodactylus altavelensis enriquilloensis Shreve

Figures 2B, 3B

Sphaerodactylus brevirostratus enriquilloensis Shreve, 1968, *Breviora*, 280:14.

Type locality. 4 km E La Descubierta, near Lago Enriquillo, Independencia Province, República Dominicana.

Holotype. MCZ 57846.

Definition. A subspecies of *Sphaerodactylus altavelensis* characterized by lack or very weak development of the scapular patch and ocelli.

Distribution. The Valle de Neiba east of the Dominico-Haitian border, south around the eastern edge of the Sierra de Baoruco to slightly beyond the city of Barahona, eastward to the Llanos de Azua (17 km E Azua), south to Punta Martín García and north at least to the Azua-San Juan province border (southeast of Guanito). A specimen from near Vallejuelo within the Sierra de Neiba is tentatively referred to this subspecies and may indicate a more widespread

occurrence of the species in the Valle de San Juan and associated areas.

Variation. We have examined 408 specimens and have taken full or partial counts on 314 of these. Largest males 26 mm, largest female 28 mm; dorsal scales axilla to groin 23 to 31 (26.1); ventral scales axilla to groin 23 to 32 (28.0); scales around midbody 38 to 50 (46.0); supralabials to mid-eye usually 3/3, rarely 3/4 or 4/4; internasals 1 (N=205), 2 (N=28), 3 (N=1); fourth toe lamellae 7 to 11 (mode 9 and 10); throat scales keeled; escutcheon 4 to 8 × 11 to 27.

The anterior and posterior cephalic figures are absent in virtually all males, although some show a residual trace of them. Scapular patches and ocelli are present (not necessarily in the same specimen) in scattered males (the frequency is less than it is for the same pattern elements in females). Ocelli in males are very reduced, often to the size of a single scale; and the patch, if present, may be no more than a small area of black pigment between the two ocelli.

The anterior cephalic figure is well developed in females; the posterior figure is not so strongly developed and is frequently represented by only a pair of

light crescents in the occipital region demarcating the posterior end of the posterior figure (Fig. 3B). Eight of 86 Valle de Neiba females and juveniles have posterior extensions of the anterior cephalic figure from roughly the middle of each lobe, which may fuse with the posterior figure or fade out in the parietal region. Although absent or very reduced, scapular ocelli and patches are present in a small proportion of all specimens throughout the range of the subspecies. For example, 17 of 86 Valle de Neiba females and juveniles have discernible ocelli; among these, some lack scapular patches of any noticeable extent, and others have them weakly developed, two having what might be termed moderate development of the patch. Eight of the ocellate females from the Valle de Neiba (28 females) occur in the Las Clavellinas series. None of the Duvergé vicinity specimens has ocelli, and only one of the females from Mella (28 females from both localities combined) has ocelli. Thus the frequency of scapular ocelli seems lower in the females from the southern side of the Valle de Neiba, although the frequency of scapular ocelli, even though very reduced in expression, is as high or higher (15 of 50) in the Barahona-and- vicinity sample as in the Valle de Neiba one. In the long series (159 specimens) from the northeastern part of Barahona Province, indications of ocelli are found on but two females (although six males have faint small ocelli). The scapular figure border is complete or nearly complete in 22 of 86 Valle de Neiba females and juveniles; others have some indication of this feature, most frequently the concave anterior border. Of the five (of 50) females from the Barahona region having indications of the scapular figure border, it is complete in only one. Approximately the same situation holds for the more eastern population of *S. a. enriquilloensis*: indications of the scapular figure border are seen, but in no specimens are they complete. Dorsal body coloration in the subspecies varies from

nearly unicolor to heavily spotted or vermiculate with dark brown; dorsolateral and lateral stripes extend the length, or nearly the length, of the body in some specimens. Ventral lines are present to a variable extent in nearly all specimens.

The 13 Punta Martín García specimens are noteworthy for their virtual lack of any pattern development in males, females, and juveniles. Two show ghost remnants of the posterior cephalic figure and scapular figure border, and others show brief ghost traces of the posterior cephalic figure; spotting and flecking is very reduced, although ventral lines are present.

The single specimen from 7 km NW Vallejuelo (between the north and south ranges of the Sierra de Neiba) clearly shows the anterior cephalic figure, traces of the posterior figure, and the anterior and posterior edges of the scapular figure border; there is a faint smudge that may represent the scapular patch and a small light marking that gives the appearance of a diverticulum of the anterior edge of the scapular figure border, but which may be a scapular ocellus. The dorsum is mottled with irregular dark markings tending to form transverse light bars in the middorsal zone between indications of dorsolateral lines (a pattern sometimes seen in other *altavelensis*); ventral lines are present but faint. We tentatively assign this specimen to the subspecies *enriquilloensis*, but the final allocation of the population represented by it must await the acquisition of more specimens.

Specimens examined. REPÚBLICA DOMINICANA: *Provincia de Independencia*: Boca de Cachón, ASFS V4381-83, ASFS V39707; 2 km E La Descubierta, ASFS V45007-08; 5 km N Jimaní, ASFS V35480-502; 10.4 km NE Jimaní, ASFS X9488-501; 5 km SE La Florida, ASFS V23303-08; 9 km W Duvergé, ASFS V20508; 7.0 km W Duvergé, ASFS V4401-06; 6.7 km NW Duvergé, ASFS V4343-47; 6 km NW Duvergé, ASFS V17170-71; La Source, about 5 km W Duvergé, ASFS V20803-06; just E Duvergé, ASFS V23276-302; outskirts of Mella, ASFS V30671-89; 8 km N Colonia Mixta, ASFS V35508; 3 km SE Angostura, ASFS V41761-64; 11 km SE

Angostura, ASFS V41299-307; *Provincia de Baruco*: 1.4 km WNW Las Clavellinas, ASFS V30377-85; Jaragua, ASFS X9787; 5.4 km ENE Neiba, ASFS V228-43; 5.9 km ENE Neiba, ASFS V30334-70; 4 km SW Galván, ASFS V40753-57; *Provincia de Barahona*: 11 km NE Cabral, ASFS V35509-10; 7.5 km E Cabral, ASFS X9623-25, ASFS V219-20, ASFS V350, ASFS V1450; 5 km S Cabral, MCZ 51820-21; 5 km N Barahona, ASFS V20515-37; Barahona, ASFS X9451, ASFS X9525; Barahona, southern outskirts, ASFS V30988-1011, ASFS V31013; 2 km SE Barahona, ASFS X9520; 4.8 km S Barahona, ASFS V14058, ASFS V14060, LDO 7-5344-50, LDO 7-5352-54, LDO 7-5361-63, LDO 7-5365-66, LDO 7-5522; 0.6 km NW Palo Alto, 31 m, ASFS V30543-72; 4.2 km NW Palo Alto, 31 m, ASFS V30530-40, ASFS V31515; Fondo Negro, ASFS X9708; 1 km NE Fondo Negro, ASFS V35667-78; El Iguito, 2.6 km NE Fondo Negro, ASFS V30495-522, ASFS V31429; 3.2 km NE Fondo Negro, ASFS X9678-81; 1.1 km NW Puerto Alejandro, ASFS V30637-47; west side, Punta Martín García, ASFS V117-29; *Provincia de Azua*: Barreras, ASFS V31176-78; 7.4 km NE Barreras, ASFS V31035-36; 19.8 km SE Guanito, 275 m, ASFS V31335-37; 15.2 km E Azua, ASFS X8095-101, ASFS V19352-54; 17 km E Azua, ASFS V21101; *Provincia de San Juan*: 7 km NW Vallejuelo, 793 m, ASFS V303.

Sphaerodactylus altavelensis brevisrostratus Shreve

Figures 2C, 3C

Sphaerodactylus brevisrostratus brevisrostratus Shreve, 1968, *Breviora* 280:10.

Type locality. 5 km S Dufort, south of Léogâne, Département de l'Ouest, Haiti.

Holotype. MCZ 63234.

Definition. A subspecies of *S. altavelensis* characterized by well-developed anterior and posterior cephalic figures in females; scapular figure present as a black patch and ocelli in all females and the majority of males; scapular figure border present in all individuals but incomplete in most.

Distribution. Haiti, from the region of Lascahobas and St. Marc on the north island, south to the Cul de Sac Plain onto the north slopes of the Massif de la Selle (Morne l'Hôpital) in the vicinity of Pétionville (and apparently as high as Furcy) and west along the base of the Tiburon Peninsula at least to between Petit-Goâve and Grand-Goâve, and south to the south coast of the peninsula to the

vicinity of Cayes Jacmel. A population at Jérémie is assigned to this subspecies; it averages lower in scale counts but agrees in coloration. Although collecting on the Tiburon Peninsula has failed to reveal any *altavelensis* between Jacmel and the Petit-Goâve records and those from Jérémie, we would not be surprised at the eventual discovery of populations in this area.

Variation. We have examined 394 specimens and taken counts on 103 of these. Largest males 25 mm SVL, largest female 28 mm dorsal scales between axilla and groin 20 to 29 (24.7); ventral scales axilla to groin 22 to 32 (26.2); mid-body scales 38 to 48 (42.9); supralabials to mid-eye 3/3 (85), 3/4 (2), 4/4 (1); internasals 0 (3), 1 (83), 2 (7); fourth toe lamellae 5 to 11 (mode 9 but 10 nearly equimodal); throat scales keeled; es-cutcheon 4 to 8 × 11 to 24.

Males are gray to gray-brown or brown and may or may not be spotted or flecked with dark brown; heads may be unicolor in combination with a spotted dorsal body pattern or may have contrasting vermiculate patterns (few specimens); the scapular patch is reduced compared with that of females and may be nearly pin-head in size or absent. The anterior cephalic figure is weakly developed in most males; the posterior cephalic figure is very weakly indicated or absent with the exception of the males having well-developed basic patterns (Fig. 2C).

Most females have well-developed anterior cephalic figures and posterior figures (Fig. 3C) but show considerable variation in expression. All females have at least some indication of a scapular patch and ocelli; the extent of the patch varies from reduced (about four scales in width by three to four scales in length at greatest length) to fully developed. Fully developed patches may be 12 scales wide and six scales in length. In the reduced form the ocelli occur at the lateral edges of the patch and may not be completely included in it.

In life, the ground color of *S. a. brevis-*

irostratus is tan to brown with dark brown markings. Anterior and posterior cephalic figures are paler (central portion) than the rest of the ground color. Scapular ocelli are white or whitish; venters are gray with brown lines. Males have yellow or yellowish heads and throats.

Specimens examined. HAITI. *Dépt. de l'Artibonite:* Pierre Payen, 14.4 km S St. Marc, ASFS V39457, ASFS V43777; *Dépt. de l'Ouest:* 3.5 km SW Lascabobas, 275 m, ASFS V26539, ASFS V26592; 10.1 km SE Montrouis, ASFS V39461-63; Trou Forban, USNM 117157-58, USNM 118894; 3.5 km SE Trou Forban, ASFS X3994-99; Ile-à-Cabrit, ASFS V40441-43; Sources Puantes, USNM 117159-64; Tabarre, 5.1 km SE François Duvalier airport, ASFS V36220; 20.2 km SE Mirebalais, 366 m, ASFS V35702; 6.2 km NW Ganthier, ASFS X2088-100, LDO 7-5799-800, LDO 7-5825-39, LDO 7-5842-43, LDO 7-5853-54, LDO 7-5801; 5.6 km E Croix des Bouquets, ASFS X2101; 12.6 km E Croix des Bouquets, ASDS V36906; 13.1 km E Croix des Bouquets, ASFS V42563-64, ASFS V8139-42, ASFS V8298-303; 13.4 km E Croix des Bouquets, ASFS V40464, ASFS 44852-55; Tête Source, 1.4 km NNE Thomazeau, ASFS V8177-78; Source Fond Parisien, ASFS V36974-77; Pétienville, ASFS V13688; Morne Calvaire, 1.6 km SW Pétienville, ASFS X1302; Furey, AMNH 124158; Diquini, ASFS X2375-79; Mariani, 11.2 km E Gressier, ASFS V8462; 6.4 km SW Léogâne, ASFS V8316; 1.6 km SE Fauché, ASFS V37270-73; \pm 6.4 km SE Fauché, ASFS V37267; 9.9 km W Fauché, ASFS X2051; beach just W Grand-Goâve, ASFS V36569-71, ASFS V42557-61; 8.8 km W Grand-Goâve, ASFS V45218-346; 4.0 km E Petit-Goâve, ASFS V43311-16, ASFS V43605-711; 7.5 km E Petit-Goâve, ASFS V43317, ASFS V43586-89, ASFS V44073-83; 1.6 km N Jacmel, ASFS V9798; La Fond, near Jacmel, MCZ 64822; less than 1.6 km W Cayes Jacmel, ASFS V9704-09; *Dépt. du Sud:* beach area within 1 km E Jérémie, ASFS V25217-29; ca. 5 km SE Jérémie, ASFS V9392; Pistache, SW Jérémie, ASFS V9126-28.

Sphaerodactylus altavelensis lucioi new subspecies

Figures 2D, 3D

Holotype. MCZ 156208, adult male, from Terre Sonnain, 1.6 km N Les Poteux, 132 m, Département de l'Artibonite, Haiti, one of a series collected 9 July 1978 by native collectors. Original number ASFS V46397.

Paratypes. ASFS V46398-404, same data as holotype; ASFS V40263-65, same locality as holotype, 9 August 1977, native collectors; ASFS V49900-01,

Balladé, 8.8 km S Port-de-Paix, Dépt. du Nord-Ouest, Haiti, 18-19 July 1979, native collectors; ASFS V46984-86, Balladé, 8.8 km S Port-de-Paix, Dépt. du Nord-Ouest, Haiti, 22 July 1978, native collectors; ASFS V47797-98, 1.9 km W Ennery, 336 m, Dépt. de l'Artibonite, Haiti, 5 August 1978, native collectors; ASFS V50141-43, 1.9 km W Ennery, 336 m, Dépt. de l'Artibonite, Haiti, 22 July 1979, native collectors; ASFS V46664-66, Gonaïves, Dépt. de l'Artibonite, Haiti, 12 July 1978, native collector.

Definition. A subspecies of *Sphaerodactylus altavelensis* characterized by a prominent anterior cephalic figure in both sexes, a very obscure to absent posterior cephalic figure in both sexes (Fig. 3D), and scapular figure present as a black patch and usually two white ocelli in almost all specimens of both sexes, the patch without edging.

Distribution. Northeastern Haiti, from the vicinity of Port-de-Paix in the north to Gonaïves in the south, and inland as far as the vicinity of Ennery.

Description of holotype. Adult male; 23 mm SVL, tail length 21 mm, tip regenerated; dorsal scales axilla to groin 29, ventral scales axilla to groin 27, scales around midbody 41; fourth toe lamellae 9; escutcheon 5 \times 22. Snout moderately blunt in dorsal aspect, very slightly depressed; snout scales moderately-sized, somewhat flattened, smooth, not imbricate; 1 internasal; 2 postnasals; supralabials to mid-eye 3/3; dorsal head scales small, elongate, keeled, almost imbricate to juxtaposed; temporal scales small, oval, keeled, subimbricate. First infralabial broader anteriorly than posteriorly, roughly rectangular in shape; gular series between infralabial rami large, juxtaposed, smooth; central gulars small, smooth, subimbricate; chest and ventral scales smooth, with about 1 lateral row of throat scales on each side keeled.

Dorsal ground color in life dark brown, dorsum finely peppered with slightly darker (grayish brown) scales; anterior cephalic figure buff, outlined with very dark brown to black, bilobed and prominent; posterior cephalic figure reduced to a series of dark flecks or spots; scapular

patch present and prominent, not bordered, black with a pair of included white ocelli, and constricted medially; tail vaguely lineate dorsally and without obvious ocellate pattern; venter creamy white, with chin and throat rather densely dotted with dark brown; a series of about four or five fragmented and irregular dark longitudinal lines on venter.

Variation. Of the 23 specimens, the largest male is 24 mm SVL, largest females 24 mm SVL; dorsal scales axilla to groin 22 to 29 (27.1), ventral scales axilla to groin 24 to 29 (26.7); midbody scales 37 to 47 (42.5); supralabials to mid-eye 3/3; internasal 1; fourth toe lamellae 8 to 13; throat scales smooth in all but three specimens, although a few lateral throat scales in lateral sequence may be keeled, whereas all other throat scales on the same specimen are smooth.

The dorsal ground color in all specimens was brown, dark brown, or almost black. Even darker dorsal body pattern elements are usually more or less isolated dark scales which give a dotted pattern. These dots may at times be aligned into a very vague series of dorsal lines. The anterior cephalic figure is bilobed and always prominent, whereas the posterior cephalic figure is absent and represented merely by a series of dark fragments. The black scapular patch is present but variable in extent in all specimens but one, although it was recorded as present in life on that specimen. Two white ocelli are present and may be included in the dark patch or occasionally lie just peripheral to it. Unregenerated tails continue the more or less lineate dorsal pattern, although the dorsal surface of the tail may have merely a random series of dark scales without any lineate effect. Sacral stripes are present in some specimens, absent in others. Throats are dotted with dark brown and venters either rather lineate with dark or not.

Females are colored and patterned dorsally like males; the anterior cephalic figure is prominent and the scapular patch is variable in expression, with

ocelli present in all specimens. Juveniles are patterned like females. Venters are like those of males except that they seem slightly more strongly lineate and there is a clearer indication of ventrolateral longitudinal stripes than in males (Fig. 3D).

Comparisons. *Sphaerodactylus a. lucioi* differs from the other subspecies of *S. altavelensis* in smaller size (although it is closest to *brevirostratus*), in having the black scapular patch and ocelli present in both sexes (the patch without a clear outline edging) and in the expression of the anterior cephalic figure and absence of the posterior figure in both sexes. The other subspecies usually have the throat scales keeled, whereas *S. a. lucioi* usually has them smooth, with at best a few lateral keeled scales. The mean of dorsal scales (27.1) is greater than those of *enriquilloensis* and *brevirostratus* (26.1 and 24.7), less than that of *altavelensis* (30.1). The mean of midbody scales is less (42.5) than that of any other subspecies (42.9 to 51.7), and that of ventral scales (26.7) is intermediate between that of *brevirostratus* (26.2) and *altavelensis* and *enriquilloensis* (27.9 and 28.0).

Remarks. We have no data on the precise niche which *S. a. lucioi* occupies. The general habitats are quite variable. The type locality is xeric, with cacti and *Agave* as typical plants, on a gravelly and rocky substrate. The specimens from Gonaïves presumably came from the vicinity of the city itself; Gonaïves lies in a xeric region. Extending inland from Gonaïves is the valley of the Rivière d'Ennery. The Ennery locality for the specimens of *S. a. lucioi* is mesic and at an elevation of 336 m; this locality is especially interesting in that there is a combination of a mesic interior and xeric exterior (= coastal) faunas there. The locality at Balladé is extremely mesic, in fact a coffee-cacao grove. Syntopic congeners of *S. a. lucioi* vary with locality: at the type-locality they are found with *S. cinereus* Wagler *sensu* Graham and Schwartz, 1978 (common) and *S. asterulus* Schwartz and Graham (rare). At

Ennery they were also taken with *S. difficilis* Barbour and *S. cinereus* in about equal frequency. Balladé yielded only *S. difficilis* in addition to *S. a. lucioi*. At any locality, the numbers of specimens of other species far outnumbered those of *S. a. lucioi*. Whether this is due to its scarcity or to its relatively smaller size is unknown; collecting was presumably non-selective.

We are pleased to name this subspecies in honor of John C. Lucio, who accompanied the junior author in Haiti for two successive summers (1978–79) and who contributed greatly to the success of both trips.

Sphaerodactylus williamsi new species

Figure 2E

Holotype. MCZ 156209, adult female, from 12.2 km W Ça Soleil, Département de l'Artibonite, Haiti, taken by native collector on 14 July 1978. Original number ASFS V46794.

Definition. An apparently small species of *Sphaerodactylus* (only known specimen 22 mm SVL), with small scales (33 keeled dorsal scales and 33 smooth ventral scales between axilla and groin, 52 scales around midbody), keeled throat scales; no area of middorsal granules or granular scales; dorsal body scales with three or four hair-bearing scale organs, each with one hair, on the posterior periphery of the scale, one organ at the apex; no head or scapular pattern or patch or ocelli, but dorsum with a series of four well-defined pale buffy lines alternating with broader dark brown lines, plus two pale dorsolateral lines; venter pale, throat with a few fine dark brown stipples and very vague indication of ventral longitudinal lines, most prominent posteriorly; head small and relatively narrow.

Distribution. Known only from the type locality (Fig. 1).

Description of holotype. Gravid female; 22 mm SVL and 17 mm tail length (mostly regenerated); dorsal scales

keeled and imbricate, small, axilla to groin 33, ventral scales axilla to groin 33, scales around midbody 52, fourth toe lamellae 10. Snout attenuate, head small and relatively narrow; snout scales moderately large, juxtaposed, smooth anteriorly and keeled posteriorly; 1 internasal; 2 postnasals; supralabials to mid-eye 3/3; dorsal head scales small, keeled, subimbricate; temporal scales small, juxtaposed, weakly keeled. First infralabial broader anteriorly than posteriorly, rectangular; gular series between rami large, smooth, juxtaposed; central gulars very small, smooth, imbricate, grading quickly to much larger keeled throat scales; chest and ventral scales smooth.

Dorsal ground color in life dark brown with four longitudinal pale buffy lines (Fig. 2E); head and neck scales without cephalic or nuchal pattern but with isolated scattered buffy scales; a pair of slightly more prominent pale buffy lines on the sides; venter creamy white, with a few scattered dark brown dots on the throat and vague indications on the posterior portion of the belly of dark longitudinal lines; no scapular patch or ocelli.

Comparisons. *Sphaerodactylus williamsi* seems most closely related to *S. altavelensis*; the basic dorsal color (dark brown) is similar in *S. williamsi* and *S. a. lucioi*. But direct comparison of the single *williamsi* with many comparably sized female *altavelensis* of any subspecies shows the much narrower and more acuminate snout of the former. Although some *S. altavelensis* are vaguely lineate, none shows the distinct lineation of *S. williamsi*. The total absence of cephalic patterns (except for the scattered pale buffy scales) and of a scapular patch and ocelli are also distinctive, especially in contrast to local *S. a. lucioi* which, in both sexes, have prominent anterior cephalic patterns and scapular patches and ocelli in both sexes. The high counts of the holotype of *S. williamsi* (dorsals 33, ventrals 33, midbody 52) are all greater than the highest

counts in local *S. a. lucioi* (29, 29, 47); the keeled throat scales of *S. williamsi* likewise are distinctive. The scale counts fall within (dorsals, midbody) or just above (ventrals) those of *S. altavelensis*; but it is the far-removed subspecies *S. a. altavelensis*, not the closer *brevirostratus*, *enriquilloensis*, or *lucioi*, whose upper parameters exceed or almost equal the counts of *S. williamsi*. The smaller scales of *S. williamsi* are obvious upon inspection and comparison with similarly sized *S. a. lucioi*, with which *S. williamsi* might be confused.

Remarks. The type locality of *S. williamsi* is a coastal oasis; the general region is called Lapierre. The surrounding area is xeric and barren (cacti, *Agave*), in strong contrast to the luxuriant growth in the oasis which is fed by a small source. Associated congeners here are *S. asterulus* and a second, as yet unnamed, species. Both these congeners are presumably more abundant in the adjacent xeric areas than within the oasis; this is certainly true for *S. asterulus*. Haitians living within the oasis are relatively independent and are not easily encouraged to collect; this may account for the lone specimen of *S. williamsi* (and perhaps even for the lack of *S. altavelensis*, which occurs only 19 km to the east at the type-locality of *lucioi* and 10 km to the south east at Gonaïves, across the Baie de Gonaïves). On the other hand, it is possible that *S. williamsi* is here at the very periphery of its range, which may encompass the herpetologically largely unknown Presqu'île du Nord-Ouest. From that peninsula proper, *S. shrevei* Lazell and *S. elegans* MacLeay are known (both from Môle St. Nicholas, far to the northwest and on the northern side of the Massif du Nord-Ouest). We call attention to this phenomenon once more: the line of demarcation between the peninsular fauna and the "mainland" fauna appears to be sharp. In the matter of *Sphaerodactylus*, *S. cinereus* and *S. altavelensis* are moderately common on the "mainland," but appear not to occur

on the peninsula. *Sphaerodactylus asterulus* is peninsular but a southern cognate of the related *S. shrevei* in the north. *Sphaerodactylus difficilis* occurs only along the northern slopes of the Massif du Nord-Ouest, as far west as Bombardopolis and also on the adjacent "mainland." The ecological relationships among this suite of congeners are indeed puzzling, and their geographical relationships are just beginning to be clarified.

We take very great pleasure in naming this new species in honor of Ernest E. Williams, who, over the years, has been a constant source of friendship, advice, cooperation, and loans of pertinent materials for our research in the Antilles.

ACKNOWLEDGMENTS

Most specimens examined for the present paper are in the Albert Schwartz Field Series (ASFS); many of them were collected under the sponsorship of National Science Foundation Grants G-7977 and B-02603 to the junior author. We thank the following field workers, both friends and students, who have helped make such a mass of material available to us: Patricia A. Adams, Robert K. Bobilin, Jeff R. Buffett, David A. Daniels, James R. Dennis, Danny C. Fowler, Eugene D. Graham, Jr., Ronald F. Klinikowski, Mark D. Lavrich, David C. Leber, James K. Lewis, John C. Lucio, Gary C. Mosely, James W. Norton, Lewis D. Ober, S. Craig Rhodes, James A. Rodgers, Jr., Bruce R. Sheplan, William W. Sommer, Michael H. Strahm, Oscar Vargas, and C. Rhea Warren. Specimens, in addition to those in the ASFS, have been examined in the following collections, to whose curators we are grateful for loans: American Museum of Natural History (AMNH—Richard G. Zweifel and George W. Foley); Museum of Comparative Zoology (MCZ—Ernest E. Williams); National Museum of Natural History (USNM—George R. Zug). Lewis

D. Ober (LDO) also allowed us to examine material in his personal collection. Finally, we are grateful to Fred G. Thompson of the Florida State Museum for allowing the junior author to retain one specimen of *S. a. altavelensis*. The illustrations are the work of David C. Leber and Alvis Gineika, to whom we are grateful, and the junior author.

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